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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/688,169	10/16/2000	Takeshi Nishimura	1035-286	9473

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EXAMINER

ZUCKER, PAUL A

ART UNIT

PAPER NUMBER

1621

DATE MAILED: 03/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/688,169

Applicant(s)

NISHIMURA ET AL.

Examiner

Paul A. Zucker

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 December 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) 1-6 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 7-11 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☒ Claim(s) 1-11 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 October 2000 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>10/22, 12/11/2001</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of Group II, claims 7-11 drawn to a method of treating a polymerizable liquid, in the paper mailed 17 December 2003 is acknowledged. Claims 1-6 drawn to a packed column are held withdrawn from consideration as being drawn to a non-elected invention.

Drawings

2. The drawings are objected to because Fig. 4 is missing from the application. Two copies of Fig. 1 are present instead. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

The following claims are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

3. Claims 7-11 are rejected under 35 U.S.C. 112, second paragraph. Claim 7 is drawn to a method of treating a polymerizable liquid with a packed column but, since the claim does not set forth any steps involved in the method/process, it is unclear what method/process applicant is intending to encompass. A claim is indefinite where it

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merely recites a use without any active, positive steps delimiting how this use is actually practiced. Claim 7 and its dependents are therefore rendered indefinite.

4. Claim 11 is rejected under 35 U.S.C. 112, second paragraph. Claim 11 recites the limitation "total area of all openings.....is in a range of 110 percent to 150 percent of a cross sectional area of said column" on lines 4-6. Since the column cross sectional area may be measured at any point in a column of potentially variable width it is impossible to determine the metes and bounds of claim 11. Claim 11 is therefore rendered indefinite.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35

U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. Claims 7, 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hardison (US 5,296,205 03-1994) in view of Nishimura et al (US 6,620,969 09-2003).

Instantly claimed is a method of treating a polymerizable liquid employing a column in which a layer of packing having a greater percentage of voids is disposed between a support plate and a layer of packing having a lower percentage of voids. Further claimed is the use of packing with a surface smoothness, R_{max} of no greater than 12.5S.

Hardison teaches (Fig. 2, see packing layers 22 and 24 and plate 20) a column packing arrangement in which packing having a greater percentage of voids is disposed between a support plate and a layer of packing having a lower percentage of voids. Hardison teaches (column 2, lines 37-64) that this arrangement reduces the surging, channeling and fouling of columns. While Hardison does not specifically teach the use of his column for easily polymerizable compounds, such use is clearly suggested (Column 1, lines 44-49) by Hardison's discussion of the problems that result when particulate matter is "formed as a result of chemical interaction". One of ordinary skill in the art would readily understand that such is the result of the polymerization of process liquids such as acrylic acid and its derivatives.

The difference between the process of Hardison and that instantly claimed is that Hardison does not teach or suggest the application of his process to distillation of acrylates or the use of smooth-surfaced packing materials.

Nishimura, however, teaches (Column 3, lines 25-39) a shell and tube heat exchanger for use in the distillation of easily polymerizable substances which has no

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part for stagnation of the process fluids. Nishimura teaches (Column 11, lines 21-44) the use of his process for acrylic and methacrylic acids and esters. Nishimura further teaches (Column 14, lines 2-10) that the use of heat transfer tubes having a surface roughness of 12.5 or less prevents polymerization of the process fluid.

One of ordinary skill in the art would therefore have been motivated to extend the improved mass-transfer process taught by Hardison to the treatment of highly polymerizable acrylic acid and its derivatives by employing smooth-surfaced packings as taught by Nishimura. Since both processes are directed toward the handling of reactive process fluids there would have been a reasonable expectation for success.

Thus the instantly claimed method would have been obvious to one of ordinary skill in the art

6. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hardison (US 5,296,205 03-1994) and Nishimura et al (US 6,620,969 09-2003) as applied to claims 7, 9 and 10 above, and further in view of Leva et al (US 4,814,117 03-1989).

Instantly claimed is a method of treating a polymerizable liquid employing a column in which a layer of packing having a greater percentage of voids is disposed between a support plate and a layer of packing having a lower percentage of voids. Further claimed is the use of a corrugated support plate.

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The difference between the process taught by Hardison and Nishimura and that instantly claimed is that Hardison teaches (Column 7, line 57) the preferred use of a support plate having a grill structure while the use of a corrugated support plate is instantly claimed.

Leva, however, teaches (Column 1, line 34 – column 2, line 22) that the disadvantages of flat support plates of the type preferred by Hardison are overcome by the use of corrugated support plates with perforated beams, providing the suggestion to replace the plates of Hardison with those of Leva. Additionally, Hardison teaches (Column 7, lines 46-54) that the support plate type is not critical but that the largest total open area is desired, again providing the suggestion for replacing the preferred support plates with those having a greater open area. Leva teaches (Column 3-22) that a disadvantage of the corrugated plate is that packing material tends to occlude the liquid drainage holes. The Examiner notes that this can be seen to be a suggestion to place packing having a large percent of voids adjacent to the corrugated support plate as taught by Hardison.

One of ordinary skill in the art would have been motivated to substitute the support plate as taught by Hardison with that of Leva in order to maximize the total open area provided by the support plates. The common field of invention (distillation) of the cited references would have produced a reasonable expectation for success in their combination.

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Thus the instantly claimed process would have been obvious to one of ordinary skill in the art

Claim Objections

7. Claim 11 is objected to because of the following informalities: The word "of" in line 7 is misspelled. Appropriate correction is required.

Conclusion

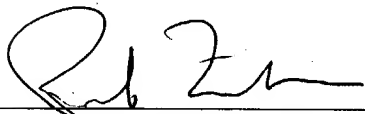
8. Claims 1-11 are pending. Claims 7-11 are rejected. Claim 11 is objected to. Claims 1-6 are held withdrawn from consideration.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Paul A. Zucker whose telephone number is 571-272-0650. The examiner can normally be reached on Monday-Friday 7:00-3:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Johann R. Richter can be reached on 571-272-0646. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read 'Paul Zucker', is written over a horizontal line.

Paul A. Zucker, Ph. D.
Patent Examiner
Technology Center 1600